

6th International Conference and Exhibition on

Biosensors & Bioelectronics

September 22-23, 2016 Phoenix, USA

Split deoxyribozyme sensors for highly selective analysis of nucleic acids

Yulia V Gerasimova¹, Dmitry M Kolpashchikov¹, Riley C Gentry¹, Eda Koculi¹, Kyle H Rohde², Larisa M Dedkova² and Sidney M Hecht²¹University of Central Florida, USA²Arizona State University, USA

Deoxyribozymes (Dz) are small catalytic DNA molecules, which can catalyze a variety of chemical reactions. Due to their structural versatility, biocompatibility, signal amplification ability and relatively low cost, Dz are widely used as scaffolds for biosensor design. Here, we present a split Dz (sDz) approach for nucleic acid sensors. A Dz is divided into two subunits, which are not catalytically active in the absence of a nucleic acid target due to spatial separation. When target is present, the two subunits are brought in proximity and the catalytic core is re-formed. As a result, target-inducible signal is generated and can be monitored for target detection and quantification. The binary design enables great selectivity because each of the two short probe-analyte hybrids is very sensitive to even a slight imperfection in the sequence of the analyzed nucleic acid. Using this approach, we have designed sDz sensors targeting rRNA of *Escherichia coli*, *Mycobacterium tuberculosis* and *M. abscesses*, which are important human pathogens. We have demonstrated that the sensors are capable of differentiation between Single Nucleotide Substitutions (SNSs) in the analyzed sequences. Therefore, it is possible to use sDz for SNSs and strain genotyping, as well as for drug susceptibility testing of bacterial pathogens. sDz sensors can be also employed for rRNA maturation monitoring and mutation analysis. The sensors can generate either fluorescent signal or color change. In their later implementation, sDz sensors can be used for point-of-care diagnostics of bacterial pathogens.

Biography

Yulia V Gerasimova has completed her PhD from Institute of Chemical Biology and Fundamental Medicine (Russia). She is currently an Assistant Professor at University of the Central Florida Chemistry Department. Her research interests include "Nucleic acid-based sensors for nucleic acid analysis", which can be applied for disease diagnostics, food and water quality monitoring, as well as for biochemistry research assays. She has published more than 20 papers in leading journals in this field.

Yulia.Gerasimova@ucf.edu

Notes: